

2009-02-20-1254-0321PUS1\_ST25  
SEQUENCE LISTING

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<120> NUCLEIC ACID CONSTRUCT CONTAINING FULL LENGTH GENOME OF HUMAN  
HEPATITIS C VIRUS ... AND METHOD OF PRODUCING HEPATITIS C VIRUS  
PARTICLE

<130> 1254-0321PUS1

<140> US 10/589,902  
<141> 2006-08-17

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<151> 2004-02-20

<160> 26

<170> PatentIn version 3.5

<210> 1  
<211> 340  
<212> RNA  
<213> Hepatitis C virus

<220>  
<221> misc\_feature  
<222> (1)..(340)  
<223> 5' non-translated region of hepatitis C virus genomic RNA derived  
from JFH-1 clone

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accugccccc aauaggggac acacuccgcc augaaucau cccugugag gaacuacugu 60  
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ccccucccg ggagagccau aguggucugc ggaaccggug aguacaccgg aauugccggg 180  
aagacugggu ccuuucuuug auaaaccac ucuauagccc gccauuuggg cgugcccccg 240  
caagacugcu agccgaguag cguuggguug cgaaaggccu ugugguacug ccugauaggg 300  
cgcuugcgag ugccccggga ggucucguag accgugcacc 340

<210> 2  
<211> 573  
<212> RNA  
<213> Hepatitis C virus

<220>  
<221> misc\_feature  
<222> (1)..(573)

<223> core protein-coding sequence of hepatitis C virus genomic RNA derived from JFH-1 clone

<400> 2  
augagcaca auccuaaacc ucaaagaaaa accaaaagaa acaccaaccg ucgcccagaa 60  
gacguuaagu ucccggggcg cggccagauc guuggcgag uauacuuguu gccgcgcagg 120  
ggccccaggu ugggugugcg cacgacaagg aaaacuucgg agcgguccca gccacguggg 180  
agacgccagc ccauccccaa agaucggcgc uccacuggca aggccugggg aaaaccaggu 240  
cgccccuggc ccuauauagg gaaugaggga cucggcuggg caggauuggc ccuguccccc 300  
cgaggcucuc gccccuccug gggccccacu gacccccggc auaggucgcg caacgugggu 360  
aaagucaucg acaccuaac guguggcuuu gccgaccuca uggguuacau ccccgucgua 420  
ggcgccccgc uuaguggcgc cgccagagcu gucgcgcacg gcgugagagu ccuggaggac 480  
gggguuuuuu augcaacagg gaaccuaccc gguuuucccu uuucuaucuu cuugcuggcc 540  
cuguuguccu gcaucaccgu uccggucucu gcu 573

<210> 3  
<211> 576  
<212> RNA  
<213> Hepatitis C virus

<220>  
<221> misc\_feature  
<222> (1)..(576)  
<223> E1 protein-coding sequence of hepatitis C virus genomic RNA derived from JFH-1 clone

<400> 3  
gcccagguga agaauaccag uagcagcuac auggugacca augacugcuc caaugacagc 60  
aucacuuggc agcucgaggc ugcgguucuc cacguccccc ggugcguccc gugcgagaga 120  
guggggaaaua cgucacggug uugggugcca gucucgcaa acauggcugu gcggcagccc 180  
ggugcccuca cgcagggucu gcggacgcac aucgauagg uugugauguc cgccaccuuc 240  
ugcucugcuc ucuacguggg ggaccucugu ggcgggguga ugcucgcggc ccagguguuc 300  
aucgucucgc cgcaguacca cugguuugug caagaauuca auugcuccau cuaccucggc 360  
accaucacug gacaccgau ggcaugggac augaugaua acuggucgcc cacggccacc 420  
augauccugg cguacgugau gcgcgucccc gaggucauca uagacaucgu uagcggggcu 480  
cacuggggcg ucauguucgg cuuggccuac uucucuaugc agggagcgug ggcgaagguc 540  
auugucaucc uucugcuggc cgcuggggug gacgcg 576

<210> 4  
<211> 1290  
<212> RNA  
<213> Hepatitis C virus

<220>  
 <221> misc\_feature  
 <222> (1)..(1290)  
 <223> E2 protein-coding sequence of hepatitis C virus genomic RNA  
 derived from JFH-1 clone

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<400> 4
ggcaccacca ccguuggagg cgcuguugca cguuccacca acgugauugc cggcguguuc      60
agccauggcc cucagcagaa cauucagcuc auuaacacca acggcaguug gcacaucaac      120
cguacugccu ugaauugcaa ugacuccuug aacaccggcu uucucgcggc cuuguucuac      180
accaaccgcu uuaacucguc agggugucca gggcgccugu ccgccugccg caacaucgag      240
gcuuuccgga uagggugggg caccuacag uacgaggaua augucaccaa uccagaggau      300
augaggccgu acugcuggca cuacccccca aagccgugug gcguaguccc cgcgaggucu      360
guguguggcc caguguacug uuucaccccc agcccguuag uagugggcac gaccgacaga      420
cguggagugc ccaccuacac auggggagag aaugagacag augucuuccu acugaacagc      480
acccgaccgc cgcagggcuc augguucggc ugcacgugga ugaacuccac ugguuucacc      540
aagacuugug gcgcgccacc uugccgcacc agagcugacu ucaacgccag cacggacuug      600
uugugcccuu cggauuguuu uaggaagcau ccugaugcca cuuauauuaa gugugguucu      660
gggcccuggc ucacacaaaa gugccugguc cacuacccuu acagacucug gcauuacccc      720
ugcacaguca auuuuaccuu cuucaagaua agaauguauug uaggggggggu ugagcacagg      780
cucacggccg caugcaacuu cacucguggg gaucgcugcg acuuggagga caggacagag      840
agucagcugu cuccucuguu gcacucuacc acggaauagg ccauccugcc cugcaccuac      900
ucagacuac ccgcuuuguc aacuggucuu cuccaccuuc accagaacau cguggacgua      960
caauacaugu auggccucuc accugcuauc acaaaauacg ucguucgaug ggagugggug     1020
guacucuauu uccugcucuu agcggacgcc agagucugcg ccugcuugug gaugcucauc     1080
uuguugggcc aggccgaagc agcauuggag aaguuggucg ucuugcacgc ugcgagugcg     1140
gcuaacugcc auggccuccu auauuuugcc aucuucucug uggcagcuug gcacaucagg     1200
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<210> 5  
 <211> 651  
 <212> RNA  
 <213> Hepatitis C virus

<220>  
 <221> misc\_feature  
 <222> (1)..(651)

<223> NS2 protein-coding sequence of hepatitis C virus genomic RNA derived from JFH-1 clone

<400> 5  
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 acacucaccc cgggguaaua gaccuccuc ggccaguguc uguggugguu gugcuauuc 120  
 cugacccugg gggagccau gauucaggag uggguaccac ccaugcaggu gcgcggcggc 180  
 cgcgauggca ucgcgugggc cgucacuaua uucugcccgg gugugguguu ugacauuacc 240  
 aaauggcuuu uggcguugcu ugggccugcu uaccucuuaa gggccgcuuu gacacaugug 300  
 ccguacuucg ucagagcuca cgcucugaua aggguaugcg cuuuggugaa gcagcucgcg 360  
 ggggguaggu auguucaggu ggcgcuaauug gcccuuggca gguggacugg caccuacauc 420  
 uaugaccacc ucacaccuau gucggacugg gccgcuagcg gccugcgcga cuuagcgguc 480  
 gccguggaac ccuauaucuu caguccgaug gagaagaagg uaucgucug gggagcggag 540  
 acggcugcau guggggacau ucuacaugga cuucccgugu ccgcccgauc cggccaggag 600  
 auccuccug gccccagcuga ugguacacc uccaaggggu ggaagcuccu u 651

<210> 6  
 <211> 1893  
 <212> RNA  
 <213> Hepatitis C virus

<220>  
 <221> misc\_feature  
 <222> (1)..(1893)  
 <223> NS3 protein-coding sequence of hepatitis C virus genomic RNA derived from JFH-1 clone

<400> 6  
 gcucccauca cugcuuauug ccagcaaaca cgaggccucc ugggcgccau aguggugagu 60  
 augacggggc gugacaggac agaacaggcc ggggaagucc aaauccuguc cacagucucu 120  
 caguccuucc ucggaacaac caucucgggg guuuugugga cuguuuacca cggagcuggc 180  
 aacaagacuc uagccggcuu acgggguccg gucacgcaga uguacucgag ugcugagggg 240  
 gacuugguag gcuggcccag ccccccuggg accaagucuu uggagccgug caagugugga 300  
 gccgucgacc uauaucuggu cacgcggaac gcugauguca ucccggcucg gagacgcggg 360  
 gacaagcggg gagcauugcu cuccccgaga ccuauuucga ccuugaaggg guccucgggg 420  
 gggccggugc ucugcccuag gggccacguc guugggcucu uccgagcagc ugugugcucu 480  
 cggggcgugg ccaauuccau cgaauuauuc cccguugaga cacucgacgu uguuacaagg 540  
 ucuccacuu ucagugacaa cagcacgcca ccggcugugc ccagaccua ucaggucggg 600  
 uacuugcaug cuccaacugg caguggaaag agcaccaagg ucccugucgc guaugccgcc 660  
 cagggguaca aaguacuagu gcuuaacccc ucgguagcug ccaccuagg guuugggcg 720

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uaccuaucca aggcacaugg caucaauccc aacauuagga cuggagucag gaccgugaug      780
accggggagg ccaucacgua cuccacauau ggcaaaauuc ugcgccgaugg gggcugcgcu      840
agcggcgccu augacaucan cauauugcgau gaauugccacg cuguggaugc uaccuccauu      900
cucggcaucg gaacgguccu ugaucaagca gagacagccg gggucagacu aacugugcug      960
gcuacggcca cccccccgg gucagugaca accccccauc ccgauauaga agagguaggc     1020
cucggggcggg agggugagau ccccuucua uggaggggcga uuccccuau cugcaucaag     1080
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ccagcucagg gagauguggu ggucgucgcc accgacgcc ucaugacggg guacacugga     1260
gacuuugacu ccgugaucga cugcaaugua gcgguacacc aagcugucga cuucagccug     1320
gaccccaccu ucacuauaac cacacagacu gucccacaag acgcugucuc acgcagucag     1380
cgccgcgggc gcacagguag aggaagacag ggcacuuaua gguauguuuc cacuggugaa     1440
cgagccucag gaauguuuga caguguagug cuuugugagu gcuacgacgc aggggcugcg     1500
ugguacgauc ucacaccagc ggagaccacc gucaggcuua gagcguauuu caacacgccc     1560
ggccuacccg ugugucaaga ccaucuugaa uuuugggagg caguuuucac cggccucaca     1620
cacauagacg cccacuuccu cucccaaaca aagcaagcgg gggagaacuu cgcguaaccua     1680
guagccuacc aagcuacggg gugcgccaga gccaaaggccc cucccccguc cugggacgcc     1740
auguggaagu gccuggcccc acucaagccu acgcuugcgg gccccacacc ucuccuguac     1800
cguuuggggc cuauuaccaa ugaggucacc cucacacacc cugggacgaa guacaucgcc     1860
acaugcaugc aagcugaccu ugaggucaug acc                                     1893

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<210> 7
<211> 162
<212> RNA
<213> Hepatitis C virus

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<220>
<221> misc_feature
<222> (1)..(162)
<223> NS4A protein-coding sequence of hepatitis C virus genomic RNA
      derived from JFH-1 clone

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<400> 7
agcacguggg uccuagcugg aggaguccug gcagccgucg ccgcauauug ccuggcgacu      60
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aaggaggucc uguaugaggc uuuugaugag auggaggaau gc                          162

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<210> 8
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<211> 783  
 <212> RNA  
 <213> Hepatitis C virus

<220>  
 <221> misc\_feature  
 <222> (1)..(783)  
 <223> NS4B protein-coding sequence of hepatitis C virus genomic RNA  
 derived from JFH-1 clone

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 gccucuaggg cggcucucan cgaagagggg cagcggauag ccgagauguu gaaguccaag 60  
 auccaaggcu ugcugcagca ggccucuaag caggcccagg acauacaacc cgcuaugcag 120  
 gcuucauggc ccaaagugga acaauuuugg gccagacaca uguggaacuu cauuagcggc 180  
 auccaauacc ugcaggauu gucaacacug ccagggaacc ccgcgguaggc uuccaugaug 240  
 gcauucagug ccgcccucac caguccguug ugcaccagua ccaccauccu ucucaacauc 300  
 augggaggcu gguuagcguc ccagaucgca ccacccgcgg gggccaccgg cuuugucguc 360  
 aguggccugg ugugggcugc cgugggcagc auaggccugg guaaggugcu gguggacauc 420  
 cuggcaggau auggugcggg cauuucgggg gccucgucg cauucaagau caugucuggc 480  
 gagaagcccu cuauggaaga ugucaucaau cuacugccug ggauccuguc uccgggagcc 540  
 cugguggugg ggucaucug cgcgcccauu cugcgccgcc acgugggacc gggggagggc 600  
 gcgguccaau ggaugaacag gcuuauugcc uuugcuucca gaggaacca cgucgccccu 660  
 acucacuacg ugacggaguc ggaugcgucg cagcguguga cccaacuacu uggcucucuu 720  
 acuauaacca gccuacucag aagacuccac aaugggauaa cugaggacug ccccauccca 780  
 ugc 783

<210> 9  
 <211> 1398  
 <212> RNA  
 <213> Hepatitis C virus

<220>  
 <221> misc\_feature  
 <222> (1)..(1398)  
 <223> NS5A protein-coding sequence of hepatitis C virus genomic RNA  
 derived from JFH-1 clone

<400> 9  
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 aaugggcuga ccucuaaaau guuccccaag cugcccggcc ucccuucau cucuugucua 120  
 aagggguaca agggugugug ggccggcacu ggcaucauga ccacgcgcug cccuugcggc 180  
 gccaacaucu cuggcaaugu ccgccugggc ucuauagagga ucacagggcc uaaaaccugc 240  
 augaacaccu ggcaggggac cuuuccuauc aaugcuaca cggagggcca gugcgcgccg 300

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aaacccccca cgaacuacaa gaccgccauc uggagggugg cggccucgga guacgcggag      360
gugacgcagc augggucgua cuccuaugua acaggacuga ccacugacaa ucugaaaauu      420
ccuugccaac uaccuucucc agaguuuuuc uccugggugg acggugugca gauccauagg      480
uuugcaccca caccaaagcc guuuuuuccg gaugaggucu cguucugcgu ugggcuaau      540
uccuaugcug ucgguucca gcuucccugu gaaccugagc ccgacgcaga cguauugagg      600
uccaugcuaa cagauccgcc ccacaucacg gcggagacug cggcgcgggcg cuuggcacgg      660
ggauaccuc caucugaggc gagcuccuca gugagccagc uaucagcacc gucgcugcgg      720
gccaccugca ccaccacag caacaccuau gacguggaca uggucgaugc caaccugcuc      780
auggagggcg guguggcuca gacagagccu gaguccaggg ugcccguucu ggacuuucuc      840
gagccaauug ccgaggaaga gagcgaccuu gagcccucaa uaccaucgga gugcaugcuc      900
cccaggagcg gguuuccacg ggccuuaccg gcuugggcac ggccugacua caaccgccg      960
cucguggaau cguggaggag gccagauuac caaccgcca ccguugcugg uugugcucuc     1020
cccccccca agaaggcccc gacgccuccc ccaaggagac gccggacagu gggucugagc     1080
gagagcacca uaucagaagc ccuccagcaa cuggccauca agaccuuugg ccagcccccc     1140
ucgagcggug augcaggcuc guccacgggg gcgggcgccg ccgaauccgg cgguccgacg     1200
uccccuggug agccggcccc cucagagaca gguuccgccu ccucuaugcc ccccucgag     1260
ggggagccug gagauccgga ccuggagucu gaucagguag agcuucaacc uccccccag     1320
gggggggggg uagcucccg uucgggcucg gggucuuggu cuacuugcuc cgaggaggac     1380
gauaccaccg ugugcugc                                     1398

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<210> 10
<211> 1773
<212> RNA
<213> Hepatitis C virus

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<220>
<221> misc_feature
<222> (1)..(1773)
<223> NS5B protein-coding sequence of hepatitis C virus genomic RNA
      derived from JFH-1 clone

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<400> 10
uccaugucau acuccuggac cggggcucua auaacucccu guagccccga agaggaaaag      60
uugccaauca acccuuugag uaacucgcug uugcgauacc auaacaaggu guacuguaca     120
acaucaaaga gcgcucaca gagggcuaaa aagguaacuu uugacaggac gcaagugcuc     180
gacgcccauu augacucagu cuuaaaggac aucaagcuag cggcuuccaa ggucagcgca     240
aggcuccuca ccuuggagga ggcgugccag uugacuccac cccauucugc aagauccaag     300

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| uauggauucg gggccaagga gguccgcagc uuguccggga gggccguuaa ccacaucaag  | 360  |
| uccgugugga aggaccuccu ggaagaccca caaacaccaa uucccacaac caucauggcc  | 420  |
| aaaaaugagg uguucugcgu ggaccccgcc aaggggggua agaaaccagc ucgccucauc  | 480  |
| guuuaccug accucggcgu ccgggucugc gagaaaaugg ccucuauga cauuacacaa    | 540  |
| aagcuuccuc aggcgguaau gggagcuucc uauggcuucc aguacucucc ugcccaacgg  | 600  |
| guggagauuc ucuugaaagc auaggcgga aagaaggacc ccauggguuu uucguaugau   | 660  |
| acccgaugcu ucgacucaac cgucacugag agagacauca ggaccgagga guccauauac  | 720  |
| caggccugcu ccugccccga ggaggcccg acugccauac acucgcugac ugagagacuu   | 780  |
| uacguaggag ggccauguu caacagcaag ggucaaaccu gcgguuacag acguugccgc   | 840  |
| gccagcgggg ugcuaaccac uagcaugggu aacaccauca caugcuauau gaaagcccua  | 900  |
| gcggccugca aggcugcggg gauaguugcg cccacaauugc ugguaugcgg cgaugaccua | 960  |
| guagucaucu cagaaagcca ggggacugag gaggacgagc ggaaccugag agccuucacg  | 1020 |
| gaggccauga ccagguacuc ugccccuccu ggugaucccc ccagaccgga auaugaccug  | 1080 |
| gagcuaauaa cauccuguuc cuaaaugug ucuguggcgu uggggcccgcg gggccgccgc  | 1140 |
| agauacuacc ugaccagaga cccaaccacu ccacucgccc gggcugccug ggaaacaguu  | 1200 |
| agacacuccc cuaucaauuc auggcuggga aacaucaucc aguaugcucc aaccuauugg  | 1260 |
| guucgcaugg uccuaaugac acacuucuuc uccauucua ugguccaaga caccuggac    | 1320 |
| cagaaccuca acuuugagau guauggauca guauacuccg ugaauccuuu ggaccuucca  | 1380 |
| gccauaaauug agagguuaca cgggcuugac gccuuuucua ugcacacaua cucucaccac | 1440 |
| gaacugacgc ggguggcuuc agcccucaga aaacuugggg cgccaccccu caggguugg   | 1500 |
| aagagucggg cucgcgcagu cagggcgucc cucaucuccc guggagggaa agcggccguu  | 1560 |
| ugcggccgau aucucuuaa uugggcggug aagaccaagc uaaaacucac uccauugccg   | 1620 |
| gaggcgccg uacuggacuu auccaguugg uucaccgucg gcgccggcg gggcgacuu     | 1680 |
| uuucacagcg ugucgcgcgc ccgaccccg ucauuacucu ucggccuacu ccuacuuuuc   | 1740 |
| guagggguag gcccuuccu acuccccgc cgg                                 | 1773 |

<210> 11  
 <211> 239  
 <212> RNA  
 <213> Hepatitis C virus

<220>  
 <221> misc\_feature  
 <222> (1)..(239)  
 <223> 3' non-translated region of hepatitis C virus genomic RNA derived from JFH-1 clone



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uuuuuuuuuu uuuuuuuuuu uuuuuuuuuu uuuuuuuuuu cccucuuuuu ucccuucuca 120  
ucuuauucua cuuuucuuuu uggugggcucc aucuuagccc uagucacggc uagcugugaa 180  
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<210> 12  
<211> 9678  
<212> RNA  
<213> Hepatitis C virus

<220>  
<221> misc\_feature  
<222> (1)..(9707)  
<223> full-length Hepatitis C virus genomic RNA derived from JFH-1 clone

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cuucacgcag aaagcgccua gccauggcgu uaguaugagu gucguacagc cuccaggccc 120  
ccccucccg ggagagccau aguggucugc ggaaccggug aguacaccgg aaaugccggg 180  
aagacugggg cccuuuuugg auaaaccac ucuaugcccg gccauuuugg cgugcccccg 240  
caagacugcu agccgaguag cguuggguug cgaaaggccu ugugguacug ccugauaggg 300  
cgcuuugcag ugccccggga ggucucguag accgugcacc augagcaca auccuaaacc 360  
ucaaagaaaa accaaaagaa acaccaaccg ucgcccagaa gacguuaagu ucccgggcg 420  
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agaucggcgc uccacuggca aggccugggg aaaaccaggu cgccccuggc cccuauaugg 600  
gaaugagggg cucggcuggg caggauaggc ccuguccccc cgaggcucuc gccccuccug 660  
gggccccacu gacccccggc auaggucgcg caacgugggu aaagucaucg acaccuaac 720  
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cgccagagcu gucgcgcacg gcgugagagu ccuggaggac gggguuaauu augcaacagg 840  
gaaccuaccc gguuuccccc uuucuaucuu cuugcuggcc cuguuguccu gcaucaccgu 900  
uccggucucu gcugcccagg ugaagaauac caguagcagc uacaugguga ccaaugacug 960  
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cccugucgag agagugggga auacgucacg guguuuggug ccagucucgc caaacauggc 1080  
ugugcggcag cccggugccc ucacgcaggg ucugcggacg cacaucgaua ugguugugau 1140  
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| ggcccaggug | uucaucgucu  | cgccgcagua  | ccacugguuu  | gugcaagaau | gcaauugcuc  | 1260 |
| caucuacccu | ggcaccauca  | cuggacaccg  | cauggcaugg  | gacaugauga | ugaacugguc  | 1320 |
| gcccacggcc | accaugaucc  | uggcguaacgu | gaugcgcguc  | cccgagguca | ucauagacau  | 1380 |
| cguuagcggg | gcucacuggg  | gcgucauguu  | cgguuuggcc  | uacuucucua | ugcagggagc  | 1440 |
| gugggcgaag | gucauuguca  | uccuucugcu  | ggccgcuggg  | guggacgcgg | gcaccaccac  | 1500 |
| cguuggaggc | gcuguugcac  | guuccaccaa  | cgugauugcc  | ggcguguuca | gccauggccc  | 1560 |
| ucagcagaac | auucagcuca  | uuaacaccaa  | cggcaguugg  | cacaucaacc | guacugccuu  | 1620 |
| gaauugcaau | gacuccuuga  | acaccggcuu  | ucucgcggcc  | uuguucuaca | ccaaccgcuu  | 1680 |
| uaacucguca | ggguguccag  | ggcgccuguc  | cgccugccgc  | aacaucgagg | cuuuccggau  | 1740 |
| aggguggggc | acccuacagu  | acgaggauaa  | ugucaccaau  | ccagaggaua | ugaggccgua  | 1800 |
| cugcuggcac | uaccccccaa  | agccgugugg  | cguagucccc  | gcgaggucug | uguguggccc  | 1860 |
| aguguacugu | uucacccccca | gcccgguaugu | agugggcacg  | accgacagac | guggagugcc  | 1920 |
| caccuacaca | uggggagaga  | augagacaga  | ugucuuccua  | cugaacagca | cccgaccgcc  | 1980 |
| gcagggcuca | ugguucggcu  | gcacguggau  | gaacuccacu  | gguuucacca | agacuugugg  | 2040 |
| cgcgccaccu | ugccgcacca  | gagcugacuu  | caacgccagc  | acggacuugu | ugugcccuac  | 2100 |
| ggauuguuuu | aggaagcauc  | cugaugccac  | uuauuuuaag  | ugugguucug | ggcccuggcu  | 2160 |
| cacaccaaag | ugccuggucc  | acuacccuua  | cagacucugg  | cauuaccccu | gcacagucua  | 2220 |
| uuuuaccauc | uucaagauaa  | gaauguaugu  | aggggggguu  | gagcacaggc | ucacggccgc  | 2280 |
| augcaacuuc | acucgugggg  | aucgcugcga  | cuuggaggac  | agggacagga | gucagcuguc  | 2340 |
| uccucuguug | cacucuacca  | cggaaugggc  | cauccugccc  | ugcaccuacu | cagacuuacc  | 2400 |
| cgcuuuguca | acuggucuuu  | uccaccuua   | ccagaacauc  | guggacguac | aaauacagua  | 2460 |
| uggccucuca | ccugcuauca  | caaaauacgu  | cguucgaugg  | gagugggugg | uacucuuuuu  | 2520 |
| ccugcucuaa | gcggacgcca  | gagucugcgc  | cugcuugugg  | augcucaucu | uguugggcca  | 2580 |
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| cccuugacc  | accuauugcc  | ucacuggccu  | auggcccuuc  | ugccuacugc | ucauggcacu  | 2760 |
| gccccggcag | gcuuaugccu  | augacgcacc  | ugugcacgga  | cagauaggcg | uggguuuuguu | 2820 |
| gauauugauc | acccucuuca  | cacucacccc  | gggguaauaag | acccuccucg | gccagugucu  | 2880 |
| guggugguug | ugcuauucc   | ugacccuggg  | ggaagccaug  | auucaggagu | ggguaccacc  | 2940 |
| caugcaggug | cgcggcgggc  | gcgauggcau  | cgcguggggc  | gucacuauau | ucugcccggg  | 3000 |
| ugugguguuu | gacauuacca  | aauggcuuuu  | ggcguugcuu  | gggccugcuu | accucuuuag  | 3060 |
| ggccgcuuug | acacaugugc  | cguacuucgu  | cagagcucac  | gcucugauaa | ggguaugcgc  | 3120 |

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|             |            |            |             |             |             |      |
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| uuugggugaag | cagcucgcgg | gggguaggua | uguucaggug  | gcgcuaauugg | cccuuggcag  | 3180 |
| guggacuggc  | accuacaucu | augaccaccu | cacaccuaug  | ucggacuggg  | ccgcuaagcgg | 3240 |
| ccugcgcgac  | uuagcggucg | ccguggaacc | caucaucuuc  | aguccgaugg  | agaagaaggu  | 3300 |
| caucgucugg  | ggagcggaga | cggcugcaug | uggggacauu  | cuacauggac  | uucccguguc  | 3360 |
| cgcccgcacuc | ggccaggaga | uccuccucgg | cccagcugau  | ggcuacaccu  | ccaaggggug  | 3420 |
| gaagcuccuu  | gcucccauca | cugcuuaugc | ccagcaaaca  | cgaggccucc  | ugggcgccau  | 3480 |
| aguggugagu  | augacggggc | gugacaggac | agaacaggcc  | ggggaagucc  | aaauccuguc  | 3540 |
| cacagucucu  | caguccuucc | ucggaacaac | caucucgggg  | guuuugugga  | cuguuuacca  | 3600 |
| cggagcuggc  | aacaagacuc | uagccggcuu | acgggguccg  | gucacgcaga  | uguacucgag  | 3660 |
| ugcugagggg  | gacuugguag | gcuggcccg  | ccccccuggg  | accaagucuu  | uggagccgug  | 3720 |
| caagugugga  | gccgucgacc | uauaucuggu | cacgcggaac  | gcugauguca  | ucccggcucg  | 3780 |
| gagacgcggg  | gacaagcggg | gagcauugcu | cuccccgcaga | cccauuucga  | ccuugaaggg  | 3840 |
| guccucgggg  | gggccggugc | ucugcccuag | gggccacguc  | guugggcuu   | uccgagcagc  | 3900 |
| ugugugcucu  | cggggcgugg | ccaaauccau | cgauuucauc  | cccguugaga  | cacucgacgu  | 3960 |
| uguuacaagg  | ucucccacuu | ucagugacaa | cagcacgcca  | ccggcugugc  | cccagaccua  | 4020 |
| ucaggucggg  | uacuugcaug | cuccaacugg | caguggaaag  | agcaccaagg  | ucccugucgc  | 4080 |
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| guuuuggggc  | uaccuaucca | aggcacaugg | caucaauccc  | aacauuagga  | cuggagucag  | 4200 |
| gaccgugaug  | accggggagg | ccaucacgua | cuccacauau  | ggcaaauuuc  | ucgccgaugg  | 4260 |
| gggcugcgcu  | agcggcgccu | augacaucau | cauauvcgau  | gaauvcacg   | cuguggaugc  | 4320 |
| uaccuccauu  | cucggcaucg | gaacgguccu | ugaucagca   | gagacagccg  | gggucagacu  | 4380 |
| aacugugcug  | gcuacggcca | cacccccggg | gucagugaca  | accccccauc  | ccgauauaga  | 4440 |
| agagguaggc  | cucgggcggg | aggguagau  | cccuucua    | gggagggcga  | uuccccuau   | 4500 |
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| guacacugga  | gacuuugacu | ccgugaucga | cugcaaugua  | gcggucaccc  | aagcugucga  | 4740 |
| cuucagccug  | gaccccaccu | ucacuauaac | cacacagacu  | gucccaaca   | acgcugucuc  | 4800 |
| acgcagucag  | cgccgcgggc | gcacagguag | aggaagacag  | ggcacuuaua  | gguauguuuc  | 4860 |
| cacuggugaa  | cgagccucag | gaauuguuga | caguguagug  | cuuugugagu  | gcuacgacgc  | 4920 |
| aggggcugcg  | ugguacgauc | ucacaccagc | ggagaccacc  | gucaggcuua  | gagcguauuu  | 4980 |

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|            |            |            |            |            |            |      |
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| caacacgccc | ggccuacccg | ugugucaaga | ccaucuugaa | uuuugggagg | caguuuucac | 5040 |
| cggccucaca | cacauagacg | cccacuuccu | cucccaaaca | aagcaagcgg | gggagaacuu | 5100 |
| cgcguaccua | guagccuacc | aagcuacggu | gugcgccaga | gccaaggccc | cucacacacc | 5160 |
| cugggacgcc | auguggaagu | gccugggccc | acucaagccu | acgcuugcgg | gccccacacc | 5220 |
| ucuccuguac | cguuuggggc | cuauuaccaa | ugaggucacc | cucacacacc | cugggacgaa | 5280 |
| guacaucgcc | acaugcaugc | aagcugaccu | ugaggucaug | accagcacgu | ggguccuagc | 5340 |
| uggaggaguc | cuggcagccg | ucgccgcuaa | uugccuggcg | acuggaugcg | uuuccaucau | 5400 |
| cggccgcuug | cacgucaacc | agcgagucgu | cguugcgccg | gauaaggagg | uccuguauga | 5460 |
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| ccaggacaua | caacccgcua | ugcaggcuuc | augggccaaa | guggaacaau | uuugggccag | 5640 |
| acacaugugg | aacuucuuua | gcggcaucca | auaccucgca | ggauugucua | cacugccagg | 5700 |
| gaaccccgcg | guggcuucca | ugauggcauu | cagugccgcc | cucaccaguc | cguugucgac | 5760 |
| caguaccacc | auccuucuca | acaucauggg | aggcugguuu | gcgucccaga | ucgcaccacc | 5820 |
| cgcggggggc | accggcuuug | ucguacagug | ccuggugggg | gcugccgugg | gcagcauagg | 5880 |
| ccuggguaag | gugcuggugg | acauccuggc | aggauauggu | gcgggcuuuu | cgggggcccc | 5940 |
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| ccgccacgug | ggaccggggg | agggcgcggu | ccaauuggau | aacaggcuua | uugccuuugc | 6120 |
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| ugugacccaa | cuacuuggcu | cucuuaucua | aaccagccua | cucagaagac | uccacaauug | 6240 |
| gauaacugag | gacugcccca | ucccaugcuc | cggauccugg | cuccgcgacg | ugugggacug | 6300 |
| gguuugcacc | aucuugacag | acuucaaaaa | uuggcugacc | ucuaaaauug | uccccaagcu | 6360 |
| gcccggccuc | cccuucaucu | cuugucaaaa | ggguuacaag | gguguguggg | ccggcacugg | 6420 |
| caucaugacc | acgcgcugcc | cuugcggcgc | caacaucucu | ggcaaugucc | gccugggcuc | 6480 |
| uauagggauc | acagggccua | aaaccugcau | gaacaccugg | caggggaccu | uuccuaucaa | 6540 |
| uugcuacacg | gagggccagu | gcgcgccgaa | acccccacg  | aacuacaaga | ccgccaucug | 6600 |
| gaggguggcg | gccucggagu | acgcggaggu | gacgcagcau | gggucguacu | ccuauguaac | 6660 |
| aggacugacc | acugacaau  | ugaaaauucc | uugccaacua | ccuucuccag | aguuuuucuc | 6720 |
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| ugaggucucg | uucugcguug | ggcuuaauuc | cuauvcuguc | gggucccagc | uucccuguga | 6840 |
| accugagccc | gacgcagacg | uauugagguc | caugcuuaca | gauccgcccc | acaucacggc | 6900 |

|  |      |
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| cguggacaug gucgaugcca accugcucau ggagggcggu guggcucaga cagagccuga  | 7080 |
| guccagggug cccguucugg acuuucucga gccaauggcc gaggaagaga gcgaccuuga  | 7140 |
| gcccuaaaua ccaucggagu gcaugcuccc caggagcggg uuuccacggg ccuuaccggc  | 7200 |
| uugggcacgg ccugacuaca acccgccgcu cguggaau cgaggaggc cagauuacca     | 7260 |
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| aaggagacgc cggacagugg gucugagcga gagcaccaua ucagaagccc uccagcaacu  | 7380 |
| ggccaucaag accuuuggcc agccccccuc gagcgugau gcaggcucgu ccacgggggc   | 7440 |
| gggcgcccgc gaauccggcg guccgacguc ccugguag cgggccccu cagagacagg     | 7500 |
| uuccgcccuc ucuaugcccc cccucgagg ggagccugga gauccggacc uggagucuga   | 7560 |
| ucagguagag cuucaaccuc cccccagg ggggggggu gcucccgguu cgggcucggg     | 7620 |
| gucuuggucu acuugcuccg aggaggacga uaccaccgug ugucucucca ugucuaucuc  | 7680 |
| cuggaccggg gcucuaauaa cuccugug cccgaagag gaaaaguugc caaucaacc      | 7740 |
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| ccuccuggaa gaccacaaa caccaauucc cacaaccauc auggccaaa augagguguu    | 8100 |
| cugcguggac cccgccaagg gggguaagaa accagcucgc cucaucguu acccugaccu   | 8160 |
| cggcguccgg gucugcgaga aaauggccu cuaugacau acacaaaagc uuccucaggc    | 8220 |
| gguaauugga gcuuccuau gcuuccagua cuccccugcc caacgggugg aguaucucu    | 8280 |
| gaaagcaugg gcggaaaaga aggaccccau ggguuuuucg uaugauacc gaugcuucga   | 8340 |
| cucaaccguc acugagagag acaucaggac cgaggagucc auauaccagg ccugcuccu   | 8400 |
| gcccgaggag gcccgcacug ccuacacuc gcugacugag agacuuuacg uaggagggcc   | 8460 |
| cauguucaac agcaaggguc aaaccugcg uuacagacgu ugccgcgcca gcggggugcu   | 8520 |
| aaccacuagc auggguaaca ccaucacau cuaugugaaa gcccuagcg ccugcaaggc    | 8580 |
| ugcggggaua guugcgcca caaugcuggu augcgcgau gaccuaguag ucaucucaga    | 8640 |
| aagccagggg acugaggagg acgagcgga ccugagagcc uucacggagg ccaugaccag   | 8700 |
| guacucugcc ccuccuggug auccccccag accggaauau gaccuggagc uaauaacauc  | 8760 |

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|   |      |
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| cuguuccuca aaugugucug uggcguuggg cccgcggggc cgccgcagau acuaccugac   | 8820 |
| cagagaccca accacuccac ucgcccgggc ugccugggaa acaguuagac acuccccuau   | 8880 |
| caauucaugg cugggaaaca ucauccagua ugcuccaacc auaugggguuc gcaugguccu  | 8940 |
| aaugacacac uucuuucca uucucauggu ccaagacacc cuggaccaga accucaacuu    | 9000 |
| ugagauguau ggaucauguau acuccgugaa uccuuuggac cuuccagcca uaaauagagag | 9060 |
| guuacacggg cuugacgccu uuucuaugca cacauacucu caccacgaac ugacgcgggu   | 9120 |
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| cgcagucagg gcgucccuca ucucccgugg agggaaagcg gccguuugcg gccgauaucu   | 9240 |
| cuucaauugg gcggugaaga ccaagcucaa acucacucca uugccggagg cgcgccuacu   | 9300 |
| ggacuuaucc aguugguua cgcucggcgc cggcgggggc gacauuuuuc acagcguguc    | 9360 |
| gcgcgcccga ccccgcucau uacucuucgg ccuacuccua cuuuucguag ggguaaggccu  | 9420 |
| cuuccuacuc cccgcucggg agagcggcac acacuaggua cacuccauag cuaacuguuc   | 9480 |
| cuuuuuuuuu uuuuuuuuuu uuuuuuuuuu uuuuuuuuuu uuuuucuuuu uuuuuuuuuc   | 9540 |
| ccucuuuuuu cccuucucau cuuauucua uuuuuuuuuu gguggcucca ucuuagcccu    | 9600 |
| agucacggcu agcugugaaa gguccgugag ccgcaugacu gcagagagug ccguaacugg   | 9660 |
| ucucucugca gaucaugu   | 9678 |

<210> 13  
 <211> 11111  
 <212> RNA  
 <213> Artificial Sequence

<220>  
 <223> replicon RNA comprising full-length Hepatitis C virus genomic RNA derived from JFH-1 clone

|  |     |
|--|-----|
| <400> 13<br>accugccccc aaauagggcg acacuccgcc augaaucacu ccccgugag gaacuacugu | 60  |
| cuucacgcag aaagcgccua gccauggcgu uaguaugagu gucguacagc cuccaggccc            | 120 |
| ccccuuccg ggagagccau aguggucugc ggaaccggug aguacaccgg aaaugccggg             | 180 |
| aagacugggg ccuuucuuug auaaaccac ucuaugccg gccauuuggg cgugcccccg              | 240 |
| caagacugcu agccgaguag cguuggguug cgaaaggccu ugugguacug ccugauaggg            | 300 |
| cgcuugcgag ugccccggga ggucucguag accgugcacc augagcaca auccuaaacc             | 360 |
| ucaaagaaaa accaaaagaa acaccaaccg ucgcccuaug auugaacaag auggauugca            | 420 |
| cgcagguucu ccggccgcuu ggguggagag gcuauucggc uaugacuggg cacaacagac            | 480 |
| aaucggcugc ucugaugccg ccguguuccg gcugucagcg caggggcgcc cgguuuuuu             | 540 |
| ugucaagacc gaccuguccg gugcccugaa ugaacugcag gacgaggcag cgcggcuau             | 600 |

|            |            |             |            |            |             |      |
|------------|------------|-------------|------------|------------|-------------|------|
| guggcuggcc | acgacgggcg | uuccuugcgc  | agcugugcuc | gacguuguca | cugaagcggg  | 660  |
| aagggacugg | cugcuauugg | gcgaagugcc  | ggggcaggau | cuccugucau | cucaccuugc  | 720  |
| uccugccgag | aaaguaacca | ucauggcuga  | ugcaaugcgg | cggcugcaua | cgcuugaucc  | 780  |
| ggcuaccugc | ccaaucgacc | accaagcgaa  | acaucgcauc | gagcgagcac | guacucggau  | 840  |
| ggaagccggu | cuugucgauc | aggauгаuc   | ggacgaagag | caucaggggc | ucgcgccagc  | 900  |
| cgaacuguuc | gccaggcuca | aggcgcgcau  | gcccgcggc  | gaggauucug | ucgugaccca  | 960  |
| uggcgaugcc | ugcuugccga | auaucauggu  | ggaaauggc  | cgcuuuucug | gauucaucga  | 1020 |
| cuguggccgg | cugggugugg | cggaccgcua  | ucaggacaua | gcguuggcua | cccugauau   | 1080 |
| ugcugaagag | cuuggcggcg | aaugggcuga  | ccgcuuccuc | gugcuuuacg | guaucgccgc  | 1140 |
| ucccgauucg | cagcgcaucg | ccuucuaucg  | ccuucugac  | gaguucucu  | gaguuaaac   | 1200 |
| ccucuccuc  | ccccccccc  | aacguuacug  | gccgaagccg | cuuggaauaa | ggccggugug  | 1260 |
| cguuugucua | uauuuuuuu  | uccaccauau  | ugccgucuuu | uggcaaugug | agggcccgga  | 1320 |
| aaccuggccc | ugucuucuu  | acgagcauuc  | cuaggggucu | uuccccucuc | gccaaaggaa  | 1380 |
| ugcaaggucu | guugaauguc | gugaagggaag | caguuccucu | ggaagcuucu | ugaagacaaa  | 1440 |
| caacgucugu | agcgacccuu | ugcaggcagc  | ggaaccccc  | accuggcgac | aggugccucu  | 1500 |
| gcggccaaaa | gccacgugua | uaagauacac  | cugcaaaggc | ggcacaaccc | cagugccacg  | 1560 |
| uugugaguug | gauaguugug | gaaagaguca  | aauggcucuc | cucaagcgua | uucaacaagg  | 1620 |
| ggcugaagga | ugcccagaag | guaccccauu  | guaugggauc | ugaucugggg | ccucggugca  | 1680 |
| caugcuuuac | auguguuuag | ucgagguuaa  | aaaaacgucu | aggccccccg | aaccacgggg  | 1740 |
| acgugguuuu | ccuuugaaaa | acacgaugau  | accaugagca | caaauccuaa | accucaaaaga | 1800 |
| aaaaccaaaa | gaaacaccaa | ccgucgcccc  | gaagacguua | aguucccggg | cggcggccag  | 1860 |
| aucguuggcg | gaguauacuu | guugccgcgc  | aggggcccc  | gguugggugu | gcgcacgaca  | 1920 |
| aggaaaacuu | cggagcgguc | ccagccacgu  | gggagacgcc | agcccauucc | caaagaucgg  | 1980 |
| cgcuccacug | gcaaggccug | gggaaaacca  | ggucgccccu | ggccccuaua | ugggaaugag  | 2040 |
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| acugaccccc | ggcauagguc | gcgcaacgug  | gguaaaguca | ucgacacccu | aacguguggc  | 2160 |
| uuugccgacc | ucauggggua | cauccccguc  | guaggcgccc | cgcuuagugg | cgccgccaga  | 2220 |
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| cccgguuucc | ccuuuucua  | cuucugcug   | gcccuguugu | ccugcaucac | cguuccgguc  | 2340 |
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|            |            |            |            |             |             |      |
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| aaggucauug | ucauccuucu | gcuggccgcu | gggguggacg | cgggcaccac  | caccguuugga | 2940 |
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| aaugacuccu | ugaacaccgg | cuuucucgcg | gccuuguucu | acaccaaccg  | cuuuaacucg  | 3120 |
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| uugcacucua | ccacggaaug | ggccauccug | cccugcaccu | acucagacuu  | acccgcuuug  | 3840 |
| ucaacugguc | uucuccaccu | ucaccagaac | aucguggacg | uacaauacau  | guauggccuc  | 3900 |
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| accaccuauu | gccucacugg | ccuauggccc | uucugccuac | ugcucauggc  | acugccccgg  | 4200 |
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| aucacccucu | ucacacucac | cccggggauu | aagaccucc  | ucggccagug  | ucuguggugg  | 4320 |
| uugugcuauu | uccugacccu | gggggaagcc | augauucagg | aguggguacc  | acccaugcag  | 4380 |



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| uugacacaug  | ugccguacuu  | cgucagagcu | cacgcucuga | uaaggguaug  | cgcuuuggug | 4560 |
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| gacuuagcgg  | ucgccgugga  | acccaucauc | uucaguccga | uggagaagaa  | ggucaucguc | 4740 |
| uggggagcgg  | agacggcugc  | auguggggac | auucuaucag | gacuucccg   | guccgcccga | 4800 |
| cucggccagg  | agauccuccu  | cggcccagcu | gauggcuaca | ccuccaagg   | guggaagcuc | 4860 |
| cuugcucca   | ucacugcuua  | ugcccagcaa | acacgaggcc | uccugggcgc  | cauaguggug | 4920 |
| aguaugacgg  | ggcgugacag  | gacagaacag | gccggggaag | uccaaauccu  | guccacaguc | 4980 |
| ucucaguccu  | uccucggaac  | aaccaucucg | gggguuuuug | ggacuguuua  | ccacggagcu | 5040 |
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| ggggggccgg  | ugcucugccc  | uaggggccac | gucguugggc | ucuuccgagc  | agcugugugc | 5340 |
| ucucggggcg  | uggccaaauc  | caucgauuuc | auccccguug | agacacucga  | cguuguuaca | 5400 |
| aggucuccca  | cuuucaguga  | caacagcacg | ccaccggcug | ugccccagac  | cuauagguc  | 5460 |
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| auaccagcuc  | agggagaugu  | gguggucguc | gccaccgacg | cccucaugac  | gggguacacu | 6120 |
| ggagacuuum  | acuccgugau  | cgacugcaau | guagcgguca | cccaagcugu  | cgacuucagc | 6180 |
| cuggacccca  | ccuucacuau  | aaccacacag | acugucccac | aagacgcugu  | cucacgcagu | 6240 |
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| gcgugguacg  | aucucacacc | agcggagacc | accgucaggg | uuagagcgua  | uuucaacacg | 6420 |
| cccggccuac  | ccguguguca | agaccaucuu | gaauuuuggg | aggcaguuuu  | caccggccuc | 6480 |
| acacacauag  | acgcccacuu | ccucucccaa | acaaagcaag | cgggggagaa  | cuucgcguac | 6540 |
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| gccaugugga  | agugccuggc | ccgacucaag | ccuacgcuug | cgggccccac  | accucuccug | 6660 |
| uaccguuugg  | gcccuauiac | caaugagguc | accucacac  | accuggggac  | gaaguacauc | 6720 |
| gccacaugca  | ugcaagcuga | ccuugagguc | augaccagca | cguggguccu  | agcuggagga | 6780 |
| guccuggcag  | ccgucgccgc | auauugccug | gcgacuggau | gcguuuuccau | caucggccgc | 6840 |
| uugcacguca  | accagcgagu | cgucguugcg | ccggauaagg | agguccugua  | ugaggcuuuu | 6900 |
| gaugagaugg  | aggaaugcgc | cucuagggcg | gcucucaucg | aagaggggca  | gcggauagcc | 6960 |
| gagauguuga  | aguccaagau | ccaaggcuug | cugcagcagg | ccucuaagca  | ggcccaggac | 7020 |
| auacaacccg  | cuaugcaggc | uucauggccc | aaaguggaac | aauiuuuggg  | cagacacaug | 7080 |
| uggaacuuca  | uuagcggcau | ccaauaccuc | gcaggauugu | caacacugcc  | agggaacccc | 7140 |
| gcgguuggcuu | ccaugauggc | auucagugcc | gccucacca  | guccguuguc  | gaccaguacc | 7200 |
| accauccuuc  | ucaacaucuu | gggaggcgug | uuagcguccc | agaucgcacc  | acccgcgggg | 7260 |
| gccaccggcu  | uugucgucag | uggccuggug | ggggcugccg | ugggcagcau  | aggccugggu | 7320 |
| aaggugcugg  | uggacauccu | ggcaggauau | ggugcgggca | uuucgggggc  | ccucgucgca | 7380 |
| uucaagauca  | ugucuggcga | gaagcccucu | auggaagaug | ucaucaaucu  | acugccuggg | 7440 |
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| acggagggcc  | agugcgcgcc | gaaaccccc  | acgaacuaca | agaccgccau  | cuggagggug | 8040 |
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| ucguucugcg | uugggcuuaa | uuccuaugcu | gucggguccc | agcuucccug  | ugaaccugag | 8280  |
| cccgcgcgag | acguauugag | guccaugcua | acagaucggc | cccacaucac  | ggcggagacu | 8340  |
| gcggcgcgcc | gcuuggcacg | gggaucaccu | ccaucugagg | cgagcuccuc  | agugagccag | 8400  |
| cuaucagcac | cgucgcugcg | ggccaccugc | accacccaca | gcaacaccua  | ugacguggac | 8460  |
| auggucgaug | ccaaccugcu | cauggagggc | gguguggcuc | agacagagcc  | ugaguccagg | 8520  |
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| auaccaucgg | agugcaugcu | ccccaggagc | ggguuuccac | gggccuuacc  | ggcuugggca | 8640  |
| cggccugacu | acaacccgcc | gcucguggaa | ucguggagga | ggccagauua  | ccaaccgccc | 8700  |
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| aacucgcugu | ugcgauacca | uaacaaggug | uacuguacaa | caucaaagag  | cgccucacag | 9240  |
| agggcuaaaa | agguaacuuu | ugacaggacg | caagugcucg | acgcccuaa   | ugacucaguc | 9300  |
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| gccccuccug  | gugaucCCCC | cagaccggaa  | uagaccugg   | agcuaauaac | auccuguucc | 10200 |
| ucaaauugugu | cuguggcggu | ggggccgcgg  | ggccgccgca  | gauacuaccu | gaccagagac | 10260 |
| ccaaccacuc  | cacucgcccc | ggcugccugg  | gaaacaguua  | gacacucCCC | uaucaauuca | 10320 |
| uggcugggaa  | acaucaucca | guaugcucca  | accauauggg  | uucgcauggu | ccuaaugaca | 10380 |
| cacuucuuu   | ccaauucacu | gguccaagac  | accugggacc  | agaaccucaa | cuuugagaug | 10440 |
| uauggauca   | uauacuccgu | gaauccuuug  | gaccuuccag  | ccaauauuga | gagguuacac | 10500 |
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 <211> 11111  
 <212> RNA  
 <213> Artificial Sequence

<220>  
 <223> full-length Hepatitis C virus genomic RNA derived from JFH-1 clone, wherein an amino acid motif GDD has been mutated into GND

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| cuucacgcag | aaagcgccua gccauggcgu uaguaugagu gucguacagc cuccaggccc 120  |
| ccccuucccg | ggagagccau aguggucugc ggaaccggug aguacaccgg aaaugccggg 180  |
| aagacugggu | ccuuuucuuu auaaaCCCac ucuauGCCCg gccauuuuggg cgugCCCCcg 240 |
| caagacugcu | agccgaguag cguuggguug cgaaaggccu ugugguacug ccugauaggg 300  |
| cgcuugcgag | ugCCCCggga ggucucguag accgugcacc augagcacia auccuaaaacc 360 |
| ucaaagaaaa | acaaaaagaa acaccaaccg ucgCCCAaug auugaacaag auggauugca 420  |
| cgcagguucu | ccggccgcuu ggguggagag gcuauucggc uaugacuggg cacaacagac 480  |

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|  |      |
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| guggcuggcc acgacgggcg uuccuugcgc agcugugcuc gacguuguca cugaagcggg  | 660  |
| aagggacugg cugcuauugg gcgaagugcc ggggcaggau cuccugucau cucaccuugc  | 720  |
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| ggcuaccugc ccauucgacc accaagcgaa acaucgcauc gagcgagcac guacucggau  | 840  |
| ggaagccggu cuugucgauc aggaugaucu ggacgaagag caucaggggc ucgcgccagc  | 900  |
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| uggcgaugcc ugcuuugccga auaucauggu ggaaaauggc cgcuuuucug gauucaucga | 1020 |
| cuguggccgg cugggugugg cggaccgcua ucaggacaua gcguuggcua cccgugauau  | 1080 |
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| ucccgauucg cagcgcaucg ccuucuaucg ccuucuuugac gaguucuuu gaguuuaaac  | 1200 |
| ccucuccuc ccccccccu aacguuacug gccgaagccg cuuggaauaa ggccggugug    | 1260 |
| cguuugucua uauguuuuu uccaccuau ucgcgucuuu uggcaaugug agggcccga     | 1320 |
| aaccuggccc ugucuuucug acgagcauuc cuagggguc uuccccucuc gccaaaggaa   | 1380 |
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| acgugguuuu ccuuugaaaa acacgaugau accaugagca caaauccuaa accucaaaga  | 1800 |
| aaaacaaaa gaaacaccaa ccgucgcca gaagacguua aguucccggg cggcggccag    | 1860 |
| aucguuggcg gaguauacuu guugccgcgc aggggccccca gguugggugu gcgcacgaca | 1920 |
| aggaaaaacu cgagcggucc ccagccacgu gggagacgcc agcccauccc caaagaucgg  | 1980 |
| cgcuccacug gcaaggccug gggaaaacca ggucgccccu ggccccuaua ugggaaugag  | 2040 |
| ggacucggcu gggcaggau gcuccugucc ccccgaggcu cucgccccuc cuggggcccc   | 2100 |
| acugaccccc ggcauagguc gcgcaacgug gguaaaaguca ucgacaccu aacguguggc  | 2160 |
| uuugccgacc ucauggggua caucccguc guaggcgccc cgcuuagugg cgccgccaga   | 2220 |
| gcugucgcgc acggcgugag aguccuggag gacggggua auuaugcaac aggggaaccua  | 2280 |
| cccgguuucc ccuuuucua cuucuuugc gcccuguugu ccugcaucac cguuccgguc    | 2340 |

|             |             |            |            |             |             |      |
|-------------|-------------|------------|------------|-------------|-------------|------|
| ucugcugccc  | aggugaagaa  | uaccaguagc | agcuacaugg | ugaccaauga  | cugcuccaau  | 2400 |
| gacagcauca  | cuuggcagcu  | cgaggcugcg | guucuccacg | uccccgggug  | cgucccgugc  | 2460 |
| gagagagugg  | ggaauacguc  | acgguguuug | gugccagucu | cgccaaacau  | ggcugugcgg  | 2520 |
| cagcccggug  | cccucacgca  | gggucugcgg | acgcacaucg | auaugguugu  | gauguccgcc  | 2580 |
| accuucugcu  | cugcucucua  | cgugggggac | cucuguggcg | gggugaugcu  | cgcgggcccag | 2640 |
| guguucaucg  | ucucgccgca  | guaccacugg | uuugugcaag | aaugcaauug  | cuccaucuac  | 2700 |
| ccuggcacca  | ucacuggaca  | ccgcauggca | ugggacauga | ugaugaacug  | gucgcccacg  | 2760 |
| gccaccauga  | uccuggcgua  | cgugaugcgc | guccccgagg | ucaucauaga  | caucguuagc  | 2820 |
| ggggcucacu  | ggggcgucau  | guucggcuug | gccuacuucu | cuaugcaggg  | agcguggggcg | 2880 |
| aaggucauug  | ucauccuucu  | gcuggccgcu | gggguggacg | cgggcaccac  | caccguugga  | 2940 |
| ggcguguuug  | cacguuccac  | caacgugauu | gccggcgugu | ucagccaugg  | cccucagcag  | 3000 |
| aacauucagc  | ucauuaacac  | caacggcagu | uggcacauca | accguacugc  | cuugaauugc  | 3060 |
| aaugacuccu  | ugaacaccgg  | cuuucucgcg | gccuuguucu | acaccaaccg  | cuuuaacucg  | 3120 |
| ucaggguguc  | cagggcgccu  | guccgccugc | cgcaacaucg | aggcuuuccg  | gauagggugg  | 3180 |
| ggcaccuac   | aguacgagga  | uaauguacac | aauccagagg | auaugaggcc  | guacugcugg  | 3240 |
| cacuaccccc  | caaagccgug  | uggcguaugc | cccgcgaggu | cugugugugg  | cccaguguac  | 3300 |
| uguuucaccc  | ccagcccggg  | aguagugggc | acgaccgaca | gacguggagu  | gcccaccuac  | 3360 |
| acaugggggag | agaauagagac | agaugucuuc | cuacugaaca | gcacccgacc  | gccgcagggc  | 3420 |
| ucaugguucg  | gcugcacgug  | gaugaacucc | acugguuuca | ccaagacuug  | uggcgcgcca  | 3480 |
| ccuugccgca  | ccagagcuga  | cuucaacgcc | agcacggacu | uguugugccc  | uacggauugu  | 3540 |
| uuuaggaagc  | auccugaugc  | cacuuauauu | aagugugguu | cuggggcccug | gcucacacca  | 3600 |
| aagugccugg  | uccacuaccc  | uuacagacuc | uggcauuacc | ccugcacagu  | caauuuuacc  | 3660 |
| aucuucaga   | uaagaaugua  | uguagggggg | guugagcaca | ggcucacggc  | cgcaugcaac  | 3720 |
| uucacucgug  | gggaucgcug  | cgacuuggag | gacagggaca | ggagucagcu  | gucuccucug  | 3780 |
| uugcacucua  | ccacggaaug  | ggccauccug | cccugcaccu | acucagacuu  | acccgcuuug  | 3840 |
| ucaacugguc  | uucuccaccu  | ucaccagaac | aucguggacg | uacaauacau  | guauggccuc  | 3900 |
| ucaccugcua  | ucacaaaaua  | cgucguucga | ugggaguggg | ugguacucuu  | auuccugcuc  | 3960 |
| uuagcggacg  | ccagagucug  | cgccugcuug | uggaugcuca | ucuuguuggg  | ccaggccgaa  | 4020 |
| gcagcauugg  | agaaguuggu  | cgucuugcac | gcugcgagug | cggcuaacug  | ccauggccuc  | 4080 |
| cuauauuuug  | ccaucuuucu  | cguggcagcu | uggcacauca | ggggucgggu  | gguccccuug  | 4140 |
| accaccuauu  | gccucacugg  | ccuauggccc | uucugccuac | ugcucauggc  | acugccccgg  | 4200 |
| caggcuuau   | ccuaugacgc  | accugugcac | ggacagauag | gcguggguuu  | guugauauug  | 4260 |

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|            |             |            |            |             |            |      |
|------------|-------------|------------|------------|-------------|------------|------|
| aucacccucu | ucacacucac  | cccggggua  | aagacccucc | ucggccagug  | ucuguggugg | 4320 |
| uugugcuau  | uccugacccu  | gggggaagcc | augauucagg | aguggguacc  | acccaugcag | 4380 |
| gugcgcggcg | gccgcgaugg  | caucgcgugg | gccgucacua | uauucugccc  | ggguguggug | 4440 |
| uuugacauua | ccaaauggcu  | uuuggcguug | cuugggccug | cuuaccucu   | aagggccgcu | 4500 |
| uugacacaug | ugccguacuu  | cgucagagcu | cacgcucuga | uaaggguaug  | cgcuuuggug | 4560 |
| aagcagcucg | cggggggguag | guauguucag | guggcgcuau | uggcccuugg  | cagguggacu | 4620 |
| ggcaccuaca | ucuauagacca | ccucacaccu | augucggacu | gggccgcuag  | cggccugcgc | 4680 |
| gacuuagcgg | ucgccgugga  | acccaucauc | uucaguccga | uggagaagaa  | ggucaucguc | 4740 |
| uggggagcgg | agacggcugc  | auguggggac | auucuaucug | gacuucccg   | guccgcccga | 4800 |
| cucggccagg | agaucuccu   | cggcccagcu | gauggcuaca | ccuccaagg   | guggaagcuc | 4860 |
| cuugcucca  | ucacugcuua  | ugcccagcaa | acacgaggcc | uccugggcgc  | cauaguggug | 4920 |
| aguaugacgg | ggcgugacag  | gacagaacag | gccggggaa  | uccaaauccu  | guccacaguc | 4980 |
| ucucaguucc | uccucggaac  | aaccaucucg | gggguuuuu  | ggacuguuua  | ccacggagcu | 5040 |
| ggcaacaaga | cucuagccgg  | cuuacgggg  | ccggucacgc | agauguacuc  | gagugcugag | 5100 |
| ggggacuugg | uaggcuggcc  | cagcccccc  | gggaccaagu | cuuuggagcc  | gugcaagugu | 5160 |
| ggagccgucg | accuauaucu  | ggucacgcgg | aacgcugaug | ucaucccgcc  | ucggagacgc | 5220 |
| ggggacaagc | ggggagcauu  | gcucuccccg | agacccauu  | cgaccuugaa  | gggguccucg | 5280 |
| ggggggccgg | ugcucugccc  | uagggggcc  | gucguugggc | ucuuccgagc  | agcugugugc | 5340 |
| ucucggggcg | uggccaaauc  | caucgauuuc | auccccguug | agacacucga  | cguuguuaca | 5400 |
| aggucucca  | cuuucaguga  | caacagcacg | ccaccggcug | ugccccagac  | cuauagguc  | 5460 |
| ggguacuugc | augcuccaac  | uggcagugga | aagagcacca | aggucccugu  | cgcguaugcc | 5520 |
| gcccaggggu | acaaaguacu  | agugcuuaac | cccucgguag | cugccacccu  | gggguuuggg | 5580 |
| gcuuaccuau | ccaaggcaca  | uggcaucaau | cccaacauua | ggacuggagu  | caggaccgug | 5640 |
| augaccgggg | aggccaucac  | guacuccaca | uauggcaau  | uucucgccga  | ugggggcugc | 5700 |
| gcuagcggcg | ccuauagacu  | caucauau   | gaugaau    | acgcugugga  | ugcuaccucc | 5760 |
| auucucggca | ucggaacggu  | ccuugaucaa | gcagagacag | ccggggucag  | acuaacugug | 5820 |
| cuggcuacgg | ccacaccccc  | cgggucagug | acaaccccc  | aucccgaau   | agaagaggua | 5880 |
| ggccucgggc | gggaggguga  | gaucuccuuc | uaugggagg  | cgauuccccu  | auccugcauc | 5940 |
| aagggagggg | gacaccugau  | uuucugccac | ucaaagaaaa | agugugacga  | gcucgcggcg | 6000 |
| gcccucggg  | gcaugggcuu  | gaaugccgug | gcuaucua   | gagggguugga | cgucuccaua | 6060 |
| auaccagcuc | agggagaugu  | gguggucguc | gccaccgacg | cccucaugac  | gggguacacu | 6120 |

|            |            |            |            |            |            |      |
|------------|------------|------------|------------|------------|------------|------|
| ggagacuuug | acuccgugau | cgacugcaau | guagcgguca | cccaagcugu | cgacuucagc | 6180 |
| cuggacccca | ccuucacuai | aaccacacag | acugucccac | aagacgcugu | cucacgcagu | 6240 |
| cagcgccgcg | ggcgcacagg | uagaggaaga | cagggcacuu | auagguaugu | uuccacuggu | 6300 |
| gaacgagccu | caggaauuu  | ugacagugua | gugcuuugug | agugcuacga | cgcaggggcu | 6360 |
| gcgugguacg | aucucacacc | agcggagacc | accgucaggg | uuagagcgua | uuucaacacg | 6420 |
| cccggccuac | ccguguguca | agaccaucuu | gaauuuuugg | aggcaguuuu | caccggccuc | 6480 |
| acacacauag | acgcccacuu | ccucucccaa | acaaagcaag | cgggggagaa | cuucgcguac | 6540 |
| cuaguagccu | accaagcuac | ggugugcgcc | agagccaagg | ccccuccccc | guccugggac | 6600 |
| gccaugugga | agugccuggc | ccgacucaag | ccuacgcuug | cgggccccac | accucuccug | 6660 |
| uaccguuugg | gcccuauiac | caaugagguc | accucacac  | accucgggac | gaaguacau  | 6720 |
| gccacaugca | ugcaagcuga | ccuugagguc | augaccagca | cguggguccu | agcuggagga | 6780 |
| guccuggcag | ccgucgccgc | auauugccug | gcgacuggau | gcuuuuccau | caucggccgc | 6840 |
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| gaugagaugg | aggaauugcg | cucuagggcg | gcucucaucg | aagaggggca | gcggauagcc | 6960 |
| gagauguuga | aguccaagau | ccaaggcuug | cugcagcagg | ccucuaagca | ggcccaggac | 7020 |
| auacaacccg | cuavgcaggc | uucauggccc | aaaguggaac | aaauuugggc | cagacacaug | 7080 |
| uggaacuuca | uuagcggcau | ccaauaccuc | gcaggauugu | caacacugcc | agggaaaccc | 7140 |
| gcgguuggcu | ccaugauggc | auucagugcc | gccucacca  | guccguuguc | gaccaguacc | 7200 |
| accauccuuc | ucaacauciu | gggaggcgug | uuagcgucc  | agaucgcacc | acccgcgggg | 7260 |
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| ggaaaccacg | ucgccccuac | ucacuacgug | acggagucgg | augcgucgca | gcuugugacc | 7620 |
| caacuacuug | gcucucuuac | uauaaccagc | cuacucagaa | gacuccacaa | uuggauaacu | 7680 |
| gaggacugcc | ccaucuccau | cuccggaucc | uggcucccg  | acguguggga | cuggguuugc | 7740 |
| accaucuuga | cagacuucua | aaauuggcug | accucuaaa  | uguuccccaa | gcugcccggc | 7800 |
| cuccccuuca | ucucuuguca | aaagggguac | aagggugugu | gggccggcac | uggcaucaug | 7860 |
| accacgcgcu | gcccuugcgg | cgccaacauc | ucuggcaaug | uccgccuggg | cucuaugagg | 7920 |
| aucacagggc | cuaaaaccug | caugaacacc | uggcagggga | ccuuuccuau | caauugcuac | 7980 |
| acggagggcc | agugcgcgcc | gaaaccccc  | acgaacuaca | agaccgccau | cuggagggug | 8040 |



|            |            |            |            |             |            |      |
|------------|------------|------------|------------|-------------|------------|------|
| gcggccucg  | aguacgcgga | ggugacgcag | caugggucgu | acuccuau    | aacaggacug | 8100 |
| accacugaca | aucugaaaau | uccuugccaa | cuaccuucuc | cagaguuuuu  | cuccugggug | 8160 |
| gacggugugc | agauccauag | guuugcaccc | acaccaaagc | cguuuuuuccg | ggaugagguc | 8220 |
| ucguucugcg | uugggcuuaa | uuccuau    | gucggguccc | agcuucccug  | ugaaccugag | 8280 |
| cccgcgcag  | acguauugag | guccaugcua | acagauccgc | cccacau     | ggcggagacu | 8340 |
| gcggcgcg   | gcuuggcacg | gggaucaccu | ccaucugagg | cgagcuccuc  | agugagccag | 8400 |
| cuau       | cagcac     | cgucgcugcg | ggccaccugc | accacccaca  | gcaacaccua | 8460 |
| uagc       | guggac     | auggucgaug | ccaaccugcu | cauggagggc  | gguguggcuc | 8520 |
| agacagagcc | ugaguccagg | gugcccguuc | uggacuuucu | cgagccaaug  | gccgaggaag | 8580 |
| agagcgaccu | ugagcccuca | auaccaucgg | agugcaugcu | ccccaggagc  | ggguuuccac | 8640 |
| gggccuuacc | ggcuugggca | cggccugacu | acaacccgcc | gcucguggaa  | ucguggagga | 8700 |
| ggccagauua | ccaaccgccc | accguugcug | guugugcucu | cccccccccc  | aagaaggccc | 8760 |
| cgacgccucc | ccaaggaga  | cgccggacag | ugggucugag | cgagagcacc  | auaucagaag | 8820 |
| cccuccagca | acuggccauc | aagaccuuug | gccagcccc  | cucgagcggu  | gaugcaggcu | 8880 |
| cguccacggg | ggcgggcgcc | gccgaauccg | gcgguccgac | guccccuggu  | gagccggccc | 8940 |
| ccucagagac | agguuccgcc | uccucuaugc | ccccccucga | gggggagccu  | ggagauccgg | 9000 |
| accuggaguc | ugaucaggua | gagcuucaac | cuc        | ccccccca    | gggggggggg | 9060 |
| guagcucccg | guucgggcuc | ggggucuu   | gg         | g           | g          | 9120 |
| g          | g          | g          | g          | g           | g          | 9180 |
| g          | g          | g          | g          | g           | g          | 9240 |
| g          | g          | g          | g          | g           | g          | 9300 |
| g          | g          | g          | g          | g           | g          | 9360 |
| g          | g          | g          | g          | g           | g          | 9420 |
| g          | g          | g          | g          | g           | g          | 9480 |
| g          | g          | g          | g          | g           | g          | 9540 |
| g          | g          | g          | g          | g           | g          | 9600 |
| g          | g          | g          | g          | g           | g          | 9660 |
| g          | g          | g          | g          | g           | g          | 9720 |
| g          | g          | g          | g          | g           | g          | 9780 |
| g          | g          | g          | g          | g           | g          | 9840 |
| g          | g          | g          | g          | g           | g          | 9900 |

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|  |       |
|--|-------|
| aacagcaagg gucaaaaccug cgguuacaga cguugccgcg ccagcggggu gcuaaccacu | 9960  |
| agcaugggua acaccaucac augcuauugug aaagcccuag cggccugcaa ggcugcgggg | 10020 |
| auaguugcgc ccacaaugcu gguaugcggc aaugaccuag uagucaucuc agaaagccag  | 10080 |
| gggacugagg aggacgagcg gaaccugaga gccuucacgg aggccaugac cagguacucu  | 10140 |
| gccccuccug gugauccccc cagaccggaa uaugaccugg agcuauaac auccuguucc   | 10200 |
| ucaaauugugu cuguggcguu gggcccgcgg ggccgccgca gauacuaccu gaccagagac | 10260 |
| ccaaccacuc cacucgcccg ggcugccugg gaaacaguua gacacucucc uaucauuca   | 10320 |
| uggcugggaa acaucaucca guaugcuca accauauggg uucgcauggu ccuaaugaca   | 10380 |
| cacuucuucu ccauucucan gguccaagac acccuggacc agaaccuca cuuugagaug   | 10440 |
| uugggaucag uauacuccgu gaauccuuug gaccuuccag ccuaauuga gagguuacac   | 10500 |
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| gcccucagaa aacuuggggc gccaccccuc agggugugga agagucgggc ucgcgcaguc  | 10620 |
| agggcgucc ucaucucucc gggagggaaa gcggccguuu gcggccgaua ucucuuaau    | 10680 |
| ugggcgguga agaccaagcu caaacucacu ccuugccgg aggcgcgccu acuggacuua   | 10740 |
| uccaguuggu ucaccgucgg cgccggcggg ggcgacauuu uucacagcgu gucgcgcgcc  | 10800 |
| cgaccccgcu cauuacucu cgccuacuc cuacuuuucg uagggguagg ccucuuccua    | 10860 |
| cuccccgcuc gguagagcgg cacacacuag guacacucca uagcuaacug uuccuuuuuu  | 10920 |
| uuuuuuuuuu uuuuuuuuuu uuuuuuuuuu uuuuuuuuuu uuuuuuuuuu uucccucuuu  | 10980 |
| cuucccuucu caucuuauuc uacuuuuuuu cuugguggc ccaucuuagc ccuagucacg   | 11040 |
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| gcagaucaug u   | 11111 |

<210> 15  
 <211> 9678  
 <212> RNA  
 <213> Artificial Sequence

<220>  
 <223> replicon RNA comprising full-length Hepatitis C virus genomic RNA derived from JFH-1 clone, wherein an amino acid motif GDD has been mutated into GND

|   |     |
|---|-----|
| <400> 15  |     |
| accugccccc aaauagggcg acacuccgcc augaaucacu cccugugag gaacuacugu  | 60  |
| cuucacgcag aaagcgccua gccauggcgu uaguaugagu gucguacagc cuccaggccc | 120 |
| ccccucccg ggagagccau aguggucugc ggaaccggug aguacaccgg aaaugccggg  | 180 |
| aagacugggg ccuuucuuug auaaaccac ucuaugccg gccauuuggg cgugcccccg   | 240 |
| caagacugcu agccgaguag cguuggguug cgaaaggccu ugugguacug ccugauaggg | 300 |

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|            |            |            |            |            |            |      |
|------------|------------|------------|------------|------------|------------|------|
| cgcuugcgag | ugccccggga | ggucucguag | accgugcacc | augagcacia | auccuaaacc | 360  |
| ucaaagaaaa | acaaaaagaa | acaccaaccg | ucgcccagaa | gacguuaagu | ucccgggcgg | 420  |
| cggccagauc | guuggcggag | uauacuuguu | gccgcgcagg | ggccccaggu | uggguugucg | 480  |
| cacgacaagg | aaaacuucgg | agcgguccca | gccacguggg | agacgccagc | ccaucuccaa | 540  |
| agaucggcgc | uccacuggca | aggccugggg | aaaaccaggu | cgccccuggc | cccuauaugg | 600  |
| gaaugaggga | cucggcuggg | caggauggcu | ccuguccccc | cgaggcucuc | gccccuccug | 660  |
| gggccccacu | gacccccggc | auaggucgcg | caacgugggu | aaagucaucg | acaccuaac  | 720  |
| guguggcuuu | gccgaccuca | uggguuacau | ccccgucgua | ggcgccccgc | uuaguggcgc | 780  |
| cgccagagcu | gucgcgcacg | gcgugagagu | ccuggaggac | gggguuauuu | augcaacagg | 840  |
| gaaccuaccc | gguuuucccu | uuucuaucuu | cuugcuggcc | cuguuguccu | gcaucaccgu | 900  |
| uccggucucu | gcugcccagg | ugaagaauac | caguagcagc | uacauaggua | ccaauagacg | 960  |
| cuccaauagc | agcaucacuu | ggcagcucga | ggcugcgguu | cuccacgucc | ccgggugcgu | 1020 |
| cccgugcgag | agagugggga | auacgucacg | guguugggug | ccagucucgc | caaacauggc | 1080 |
| ugugcggcag | cccggugccc | ucacgcaggg | ucugcggacg | cacaucgaua | ugguugugau | 1140 |
| guccgccacc | uucugcucug | cucucucacg | gggggaccuc | uguggcgggg | ugaugcucgc | 1200 |
| ggcccaggug | uucaucgucu | cgccgcagua | ccacugguuu | gugcaagaau | gcaauugcuc | 1260 |
| caucuacccu | ggcaccauca | cuggacaccg | cauggcaugg | gacaugauga | ugaacugguc | 1320 |
| gcccacggcc | accaugaucc | uggcguacgu | gaugcgcguc | cccgagguca | ucauagacau | 1380 |
| cguuagcggg | gcucacuggg | gcucauguu  | cggcuuggcc | uacuucucua | ugcagggagc | 1440 |
| gugggcgaag | gucauuguca | uccuucugcu | ggccgcuggg | guggacgcgg | gcaccaccac | 1500 |
| cguuggaggc | gcuguugcac | guuccaccaa | cgugauugcc | ggcguguuca | gccauggccc | 1560 |
| ucagcagaac | auucagcuca | uuuacaccaa | cggcaguugg | cacaucaacc | guacugccuu | 1620 |
| gaauugcaau | gacuccuuga | acaccggcuu | ucucgcggcc | uuguucuaca | ccaaccgcuu | 1680 |
| uaacucguca | ggguguccag | ggcgccuguc | cgccugccgc | aacaucgagg | cuuuccggau | 1740 |
| aggguugggg | acccuacagu | acgaggauaa | ugucaccaau | ccagaggaua | ugaggccgua | 1800 |
| cugcuggcac | uaccccccaa | agccgugugg | cguagucccc | gcgaggucug | uguguggccc | 1860 |
| aguguacugu | uucaccccc  | gcccguagu  | agugggcacg | accgacagac | guggagugcc | 1920 |
| caccuacaca | uggggagaga | augagacaga | ugucuuccua | cugaacagca | cccgaccgcc | 1980 |
| gcagggcuca | ugguucggcu | gcacguggau | gaacuccacu | gguuucacca | agacuugugg | 2040 |
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&lt;212&gt; RNA

&lt;213&gt; Artificial Sequence

&lt;220&gt;

&lt;223&gt; replicon RNA derived from the expression vector rFGR-JFH1/Luc

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## 2009-02-20-1254-0321PUS1\_ST25

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| gcccccgaa  | ccacggggac | gugguuuucc | uuugaaaaac  | acgaugauac  | caugagcaca | 2640 |
| aauccuaaac | cucaaagaaa | aacaaaaaga | aacaccaacc  | gucgcccaga  | agacguuaag | 2700 |
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| accaaugacu | gcuccaauga | cagcaucacu | uggcagcucg  | aggcugcggu  | ucuccacguc | 3300 |
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| aucuagaca  | ucguuagcgg | ggcucacugg | ggcgucaugu | ucggcuuggc | cuacuucucu | 3720 |
| augcagggag | cgugggagaa | ggucauuguc | auccuucugc | uggccgcugg | gguggacgcg | 3780 |
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| cguacugccu | ugaauugcaa | ugacuccuug | aacaccggcu | uucucgcggc | cuuguucua  | 3960 |
| accaaccgcu | uuaacucguc | agggugucca | gggcgccugu | ccgccugccg | caacaucgag | 4020 |
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| cuucccgugu | ccgcccgcac  | cggccaggag  | auccuccucg  | gccagcuga  | uggcuacacc  | 5700 |
| uccaaggggu | ggaagcuccu  | ugcucccauc  | acugcuuau   | cccagcaaac | acgaggccuc  | 5760 |
| cugggcgcca | uaguggugag  | uauagcggg   | cgugacagga  | cagaacaggc | cggggaaguc  | 5820 |
| caaauccugu | ccacagucuc  | ucaguccuuc  | cucggaacaa  | ccaucucggg | gguuuugugg  | 5880 |
| acuguuuacc | acggagcugg  | caacaagacu  | cuagccggcu  | uacggggucc | ggucacgcag  | 5940 |
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| uuggagccgu | gcaagugugg  | agccgucgac  | cuauaucugg  | ucacgcggaa | cgugauguc   | 6060 |
| aucccggcuc | ggagacgcgg  | ggacaagcgg  | ggagcauugc  | ucuccccgag | acccaauucg  | 6120 |
| accuugaagg | gguccucggg  | ggggccggug  | cucugcccu   | ggggccacgu | cguugggcuc  | 6180 |
| uuccgagcag | cugugugcuc  | ucggggcgug  | gccaaaucca  | ucgauuucau | ccccguugag  | 6240 |
| acacucgacg | uuguuacaag  | gucucccacu  | uucagugaca  | acagcacgcc | accggcugug  | 6300 |
| ccccagaccu | aucaggucgg  | guacuugcau  | gcuccaacug  | gcaguggaaa | gagcaccaag  | 6360 |
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| gccaccucgg | gguuuggggc  | guaccuaucc  | aaggcacaug  | gcaucaaucc | caacauuagg  | 6480 |
| acuggaguca | ggaccgugau  | gaccggggag  | gccaucacgu  | acuccacaua | uggcaauuuu  | 6540 |
| cucgccgaug | ggggcugcgc  | uagcggcgcc  | uauagacauca | ucauaugcga | ugaaugccac  | 6600 |
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| gacgcugucu | cacgcaguca  | gcgccgcggg  | cgcacaggua  | gaggaagaca | gggcacuuau  | 7140 |
| agguauguuu | ccacugguga  | acgagccuca  | ggaauuuug   | acaguguagu | gcuuugugag  | 7200 |
| ugcuacgacg | caggggcugc  | gugguacgau  | cucacaccag  | cggagaccac | cgucaggcuu  | 7260 |
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| ccugggacga  | aguacaucgc | cacaugcaug | caagcugacc | uugaggucau  | gaccagcacg  | 7620 |
| uggguccuag  | cuggaggagu | ccuggcagcc | gucgccgcau | auugccuggc  | gacuggaugc  | 7680 |
| guuuuccauca | ucggccgcuu | gcacgucaac | cagcgagucg | ucguugcgcc  | ggauaaggag  | 7740 |
| guccuguaug  | aggcuuuuga | ugagauggag | gaaugcgccu | cuagggcggc  | ucucaucgaa  | 7800 |
| gaggggcagc  | ggauagccga | gauguugaag | uccaagaucc | aaggcuugcu  | gcagcaggcc  | 7860 |
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| acacugccag  | ggaaccccg  | gguggcuucc | augauggcau | ucagugccgc  | ccucaccagu  | 8040 |
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| agcgaccuug | agcccucaau  | accaucggag | ugcaugcucc | ccaggagcg  | guuuccacgg | 9480  |
| gccuuaccgg | cuugggcacg  | gccugacuac | aaccgcgccg | ucguggaauc | guggaggagg | 9540  |
| ccagauuacc | aaccgcccac  | cguugcuggu | ugugcucucc | cccccccaa  | gaaggccccg | 9600  |
| acgccucccc | caaggagacg  | ccggacagug | ggucugagcg | agagcaccau | aucagaagcc | 9660  |
| cuccagcaac | uggccaauca  | gaccuuuggc | cagccccccu | cgagcgguga | ugcaggcucg | 9720  |
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| aaccucaacu  | uugagaugua | uggaucagua | uacuccguga  | auccuuugga | ccuuccagcc  | 11340 |
| auaaauugaga | gguuacacgg | gcuugacgcc | uuuucuaugc  | acacauacuc | ucaccacgaa  | 11400 |
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| aucuuagccc  | uagucacggc | uagcugugaa | agguccguga  | gccgcaugac | ugcagagagu  | 11940 |
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<213> Artificial Sequence

<220>

<223> replicon RNA derived from the expression vector rFGR-JFH1/Luc/GND

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| cuucacgcag  | aaagcgccua | gccauggcgu | uaguaugagu | gucguacagc | cuccaggccc | 120 |
| ccccuucccg  | ggagagccau | aguggucugc | ggaaccggug | aguacaccgg | aaugccggg  | 180 |
| aagacugggu  | ccuuucuuug | auaaacccac | ucuaugcccc | gccauuuggg | cgugcccccg | 240 |
| caagacugcu  | agccgaguag | cguuggguug | cgaaaggccu | ugugguacug | ccugauaggg | 300 |
| cgcuugcgag  | ugccccggga | ggucucguag | accgugcacc | augagcacia | auccuaaacc | 360 |
| ucaaaagaaa  | acaaaagaa  | acaccaaccg | acgcguaaug | gaagacgcca | aaaacauaaa | 420 |
| gaaaggcccc  | gcgccauucu | auccucugga | ggauggaacc | gcuggagagc | aacugcauaa | 480 |
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| ggugaacauc  | acguacgcgg | aauacuucga | aauguccguu | cgguuggcag | aagcuauгаа | 600 |
| acgauauggg  | cugaauacaa | aucacagaau | cgucguaugc | agugaaaacu | cucuucaauu | 660 |
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| uuccaaaaag | ggguugcaaa | aaauuuugaa | cgugcaaaaa | aaauuaccaa  | uaauccagaa | 840  |
| aaauauuau  | auggauucua | aaacggauua | ccagggauuu | cagucgaugu  | acacguucgu | 900  |
| cacauucua  | cuaccucccg | guuuuaauga | auacgauuuu | guaccagagu  | ccuuugaucg | 960  |
| ugacaaaaca | auugcacuga | uaaugaacuc | cucuggaucu | acuggguuac  | cuaagggugu | 1020 |
| ggcccuuccg | cauagaacug | ccugcgucag | auucucgcau | gccagagauc  | cuauuuuugg | 1080 |
| caaucaaauc | auuccggaua | cugcgauuuu | aaguguuguu | ccauuccauc  | acgguuuugg | 1140 |
| aauguuuacu | acacucggau | auuugauaug | uggauuucga | gucgucuuua  | uguauagauu | 1200 |
| ugaagaagag | cuguuuuuac | gaucccuuca | ggauuacaaa | auucaaaagug | cguugcuagu | 1260 |
| accaaccua  | uuuucuuuc  | ucgccaaaag | cacucugauu | gacaaaucg   | auuuaucuua | 1320 |
| uuuacacgaa | auugcuucug | ggggcgacc  | ucuuucgaaa | gaagucgggg  | aagcgguugc | 1380 |
| aaaacgcuuc | caucuuccag | ggauacgaca | aggauauggg | cucacugaga  | cuacaucagc | 1440 |
| uauucugauu | acacccgagg | gggaugauaa | accgggcgcg | gucgguaaag  | uuguuccauu | 1500 |
| uuuugaagcg | aagguugugg | aucuggauac | cgggaaaacg | cugggcguua  | aucagagagg | 1560 |
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| agacgaacac | uuuuuauag  | uugaccgcuu | gaagucuuua | auuaauaca   | aaggauauca | 1740 |
| gguggccccc | gcugaauugg | aaucgauuuu | guuacaacac | cccaacauu   | ucgacgcggg | 1800 |
| cguggcaggu | cuucccgacg | augacgccgg | ugaacuuccc | gccgccguug  | uuguuuugga | 1860 |
| gcacggaaag | acgaugacgg | aaaaagagau | cguggauuac | gucgccaguc  | aaguaacaac | 1920 |
| cgcgaaaaag | uugcgcgagg | gaguuguguu | uguggacgaa | guaccgaaag  | gucuuaccgg | 1980 |
| aaaacucgac | gcaagaaaaa | ucagagagau | ccucauaaag | gccaagaagg  | gcggaaaguc | 2040 |
| caauuuguaa | guuuuaaccc | ucuccucucc | ccccccuua  | cguuacuggc  | cgaagccgcu | 2100 |
| uggaauaagg | ccggugugcg | uuugucuaaa | uguuuuuuuc | caccuauuug  | ccgucuuuug | 2160 |
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| ccccucucgc | caaaggaaug | caaggucugu | ugaaugucgu | gaaggagca   | guuccucugg | 2280 |
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| cuggcgacag | gugccucugc | ggccaaaagc | cacguguaua | agauacaccu  | gcaaaggcgg | 2400 |
| cacaacccca | gugccacguu | gugaguugga | uaguugugga | aagagucaaa  | uggcucuccu | 2460 |
| caagcguaau | caacaagggg | cugaaggau  | cccagaaggu | accccauugu  | augggauucg | 2520 |
| aucugggggc | ucggugcaca | ugcuuuacau | guguuuaguc | gagguuuaaa  | aaacgucuag | 2580 |
| gcccccgaa  | ccacggggac | gugguuuucc | uuugaaaaac | acgaugauac  | caugagcaca | 2640 |



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| uucccgggcg  | gcggccagau | cguuggcgga | guauacuugu | ugccgcgcag | gggccccagg | 2760 |
| uuggguuguc  | gcacgacaag | gaaaacuucg | gagcgguccc | agccacgugg | gagacgccag | 2820 |
| cccaucccc   | aagaucggcg | cuccacuggc | aaggccuggg | gaaaaccagg | ucgccccugg | 2880 |
| ccccuauaug  | ggaaugaggg | acucggcugg | gcaggauggc | uccugucucc | ccgaggcucu | 2940 |
| cgccccuccu  | ggggccccac | ugaccccccg | cauaggucgc | gcaacguggg | uaaagucauc | 3000 |
| gacaccuuaa  | cguguggcuu | ugccgaccuc | augggguaca | uccccgucgu | aggcgccccg | 3060 |
| cuuaguggcg  | ccgccagagc | ugucgcgcac | ggcgugagag | uccuggagga | cgggguuaau | 3120 |
| uauagcaacag | ggaaccuacc | cgguuucccc | uuuucuauc  | ucuugcuggc | ccuguugucc | 3180 |
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| accaaugacu  | gcuccaauga | cagcaucacu | uggcagcucg | aggcugcggu | ucuccacguc | 3300 |
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| ccaaacaugg  | cugugcggca | gcccggugcc | cucacgcagg | gucugcggac | gcacaucgau | 3420 |
| augguuguga  | uguccgccac | cuucugcucu | gcucucuacg | ugggggaccu | cuguggcggg | 3480 |
| gugaugcucg  | cggcccaggu | guucaucguc | ucgccgcagu | accacugguu | ugugcaagaa | 3540 |
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| augaacuggu  | cgcccacggc | caccaugauc | cuggcguacg | ugaugcgcg  | ccccgagguc | 3660 |
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| augcagggag  | cgugggcgaa | ggucauuguc | auccuucugc | uggccgcugg | gguggacgcg | 3780 |
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| accaaccgcu  | uaaacucguc | aggguugucc | gggcgcugcu | ccgccugccg | caacaucgag | 4020 |
| gcuuuccgga  | uagggugggg | caccuacag  | uacgaggaua | augucaccaa | uccagaggau | 4080 |
| augaggccgu  | acugcuggca | cuacccccca | aagccgugug | gcuaguccc  | cgcgaggucu | 4140 |
| guguguggcc  | caguguacug | uuuaccccc  | agcccguuag | uagugggcac | gaccgacaga | 4200 |
| cguuggaguc  | ccaccuacac | auggggagag | aaugagacag | augucuuccu | acugaacagc | 4260 |
| acccgaccgc  | cgcagggcuc | augguucggc | ugcacgugga | ugaacuccac | ugguuucacc | 4320 |
| aagacuugug  | gcgcgccacc | uugccgcacc | agagcugacu | ucaacgccag | cacggacuug | 4380 |
| uugugcccua  | cggauuguuu | uaggaagcau | ccugaugcca | cuuauuuuaa | gugugguucu | 4440 |
| gggcccuggc  | ucacacaaa  | gugccugguc | cacuacccuu | acagacucug | gcuuuacccc | 4500 |

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| cucacggccg | caugcaacuu | cacucguggg  | gaucgcugcg | acuuggagga  | cagggacagg  | 4620 |
| agucagcugu | cuccucuguu | gcacucuacc  | acggaauggg | ccauccugcc  | cugcaccuac  | 4680 |
| ucagacuua  | ccgcuuuguc | aacugggucuu | cuccaccuuc | accagaacau  | cguggacgua  | 4740 |
| caauacaugu | auggccucuc | accugcuau   | acaaaauacg | ucguucgaug  | ggagugggug  | 4800 |
| guacucuuau | uccugcucuu | agcggacgcc  | agagucugcg | ccugcuugug  | gaugcucauc  | 4860 |
| uuguuggggc | aggccgaagc | agcauuggag  | aaguuggucg | ucuugcacgc  | ugcgagugcg  | 4920 |
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| cucauggcac | ugccccggca | ggcuuau     | uagacgcac  | cugugcacgg  | acagauaggc  | 5100 |
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| uucugcccgg | gugugguguu | ugacauuacc  | aaauggcuuu | uggcguugcu  | ugggccugcu  | 5340 |
| uaccucuuaa | gggccgcuuu | gacacaugug  | ccguacuucg | ucagagcuca  | cgucucugaua | 5400 |
| aggguaugcg | cuuuggugaa | gcagcucgcg  | ggggguaggu | auguucaggu  | ggcgcuauug  | 5460 |
| gcccugggca | gguggacugg | caccuacau   | uagaccacc  | ucacaccuau  | gucggacugg  | 5520 |
| gccgcua    | gccugcgca  | cuuagcgguc  | gccguggaac | ccaucaucuu  | caguccgaug  | 5580 |
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| cugggcgcca | uaguggugag | uagacgggg   | cgugacagga | cagaacaggc  | cggggaaguc  | 5820 |
| caaauccugu | ccacagucuc | ucaguccuuc  | cucggaacaa | ccaucucggg  | gguuuugugg  | 5880 |
| acuguuuacc | acggagcugg | caacaagacu  | cuagccggcu | uacggggucc  | ggucacgcag  | 5940 |
| auguacucga | gugcugaggg | ggacuuggua  | ggcuggccca | gccccccugg  | gaccaagucu  | 6000 |
| uuggagccgu | gcaagugugg | agccgucgac  | cuauaucugg | ucacgcggaa  | cgcu        | 6060 |
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| acacucgacg | uuguuacaag | gucucccacu  | uucagugaca | acagcacgcc  | accggcugug  | 6300 |
| ccccagaccu | aucaggucgg | guacuugcau  | gcuccaacug | gcaguggaaa  | gagcaccaag  | 6360 |
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|             |            |             |             |            |            |      |
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| gccacccugg  | gguuuggggc | guaccuaucc  | aaggcacaug  | gcaucaaucc | caacauuagg | 6480 |
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| ggggucagac  | uaacugugcu | ggcuacggcc  | acaccccccg  | ggucagugac | aaccccccau | 6720 |
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| auuccccuau  | ccugcaucaa | gggagggaga  | caccugauuu  | ucugccacuc | aaagaaaaag | 6840 |
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| gacgcugucu  | cacgcaguca | gcgccgcggg  | cgcacaggua  | gaggaagaca | gggcacuuau | 7140 |
| agguauuuu   | ccacugguga | acgagccuca  | ggaauuuug   | acaguguagu | gcuuugugag | 7200 |
| ugcuacgacg  | caggggcugc | gugguacgau  | cucacaccag  | cggagaccac | cgucaggcuu | 7260 |
| agagcguauu  | ucaacacgcc | cggccuaccc  | gugugucaag  | accaucuuu  | auuuugggag | 7320 |
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| cuccacaauu | ggauaacuga  | ggacugcccc | aucccaugcu | ccggauccug | gcuccgcgac  | 8580  |
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| ggauucgggg | ccaaggaggu  | ccgcagcuug  | uccgggaggg | ccguuaacca | caucaagucc | 10320 |
| guguggaagg | accuccugga  | agaccacaaa  | acaccaauuc | ccacaaccau | cauggccaaa | 10380 |
| aaugaggugu | ucugcgugga  | ccccgccaa   | ggggguaaga | aaccagcucg | ccucaucguu | 10440 |
| uaccugacc  | ucggcguccg  | ggucugcgag  | aaaauaggcc | ucuaugacau | uacacaaaag | 10500 |
| cuuccucagg | cgguaauggg  | agcuuccuau  | ggcuuccagu | acuccccugc | ccaacgggug | 10560 |
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| cgcauggucc | uaaugacaca  | cuucuuucc   | auucucaugg | uccaagacac | ccuggaccag | 11280 |
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| uuuuuuuuuu | cccucuuucu  | ucccuucuca  | ucuuauucua | cuuucuuucu | ugguggcucc | 11880 |
| aucuuagccc | uagucacggc  | uagcugugaa  | agguccguga | gccgcaugac | ugcagagagu | 11940 |
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&lt;211&gt; 11036

&lt;212&gt; RNA

&lt;213&gt; Artificial Sequence

&lt;220&gt;

&lt;223&gt; replicon RNA derived from the expression vector rFGR-JFH1/EGFP

&lt;400&gt; 23

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## 2009-02-20-1254-0321PUS1\_ST25

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 caagacugcu agccgaguag cguuggguug cgaaaggccu ugugguacug ccugauaggg 300  
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 ucaaagaaaa accaaaagaa acaccaaccg acgcguaaug cugcugcugc ugucugcugc 420  
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|             |            |             |            |            |            |       |
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| cucaugguucc | aagacacccu | ggaccagaac  | cucaacuug  | agauguauug | aucaguauac | 11220 |
| uccgugaau   | cuuuggaccu | uccagccaau  | auugagaggu | uacacgggcu | ugacgccuuu | 11280 |
| ucuaugcaca  | cauacucuca | ccacgaacug  | acgcggggug | cuucagcccu | cagaaaacuu | 11340 |
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| gucggcgccg  | gcggggggcg | cauuuuucac  | agcgugucgc | gcgcccgcac | ccgcucauuu | 11580 |
| cucuucggcc  | uacuccuacu | uuucguaggg  | guaggccucu | uccuacucuc | cgucgguag  | 11640 |
| agcggcacac  | acuagguaca | cuccauagcu  | aacuguuccu | uuuuuuuuuu | uuuuuuuuuu | 11700 |
| uuuuuuuuuu  | uuuuuuuuuu | uuuuuuuuuu  | uuuuuuuuuu | uuuuuuuuuu | uuuuuuuuuu | 11760 |
| uuuuuuuuuu  | uuuuuuuuuu | uuuuuuuuuu  | uuuuuuuuuu | uuuuuuuuuu | uuuuuuuuuu | 11820 |
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<211> 11876

<212> RNA

<213> Artificial Sequence

<220>

<223> replicon RNA derived from the expression vector  
rFGR-JFH1/SEAP/GND

<400> 26

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| cuucacgcag | aaagcgccua | gccauggcgu | uaguaugagu  | gucguacagc | cuccaggccc | 120 |
| ccccuucccg | ggagagccau | aguggucugc | ggaaccggug  | aguacaccgg | aaugccggg  | 180 |
| aagacugggu | ccuuucuuug | auaaaccac  | ucuaugccc   | gccauuuggg | cgugccccc  | 240 |
| caagacugcu | agccgaguag | cguuggguug | cgaaaggccu  | ugugguacug | ccugauaggg | 300 |
| cgcuugcgag | ugccccggga | ggucucguag | accgugcacc  | augagcaca  | auccuaaacc | 360 |
| ucaaaagaaa | acaaaagaa  | acaccaaccg | acgcguaaug  | cugcugcugc | ugcugcugcu | 420 |
| gggccugagg | cuacagcucu | cccugggcgu | caucccaguu  | gaggaggaga | acccggacuu | 480 |
| cuggaaccgc | gaggcagccg | aggcccuggg | ugccgccaag  | aagcugcagc | cugcacagac | 540 |
| agccgccaag | aaccucauca | ucuuccuggg | cgauuggaug  | ggggugucua | cggugacagc | 600 |
| ugccaggau  | cuaaaagggc | agaagaagga | caaacugggg  | ccugagauac | cccuggccau | 660 |
| ggaccgcuuc | ccauaugugg | cucuguccaa | gacauacaau  | guagacaaac | augugccaga | 720 |
| caguggagcc | acagccacgg | ccuaccugug | cggggucaag  | ggcaacuucc | agaccuauug | 780 |



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|  |      |
|--|------|
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| gcagcacgcc ucgccagccg gcaccuacgc ccacacggug aaccgcaacu gguacucgga  | 960  |
| cgccgacgug ccugccucgg cccgccagga ggggugccag gacaucgcu gacagcucau   | 1020 |
| cuccaacaug gacauugacg ugauccuagg uggaggccga aaguacaugu uucgcauggg  | 1080 |
| aaccccagac ccugaguacc cagaugacua cagccaaggu gggaccaggc uggacgggaa  | 1140 |
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| ugagcucaug caggcuuccc uggacccguc ugugaccuau cucauggguc ucuuugagcc  | 1260 |
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| gaucauguuc gacgacgcca uugagagggc gggccagcuc accagcgagg aggacacgcu  | 1500 |
| gagccucguc acugccgacc acuccacgu cuucuccuuc ggaggcuacc cccugcgagg   | 1560 |
| gagcucauc uucgggucgg cccugggcaa ggcccgggac aggaaggccu acacgguccu   | 1620 |
| ccuauacgga aacgguccag gcuaugugcu caaggacggc gcccggccgg auguuaccga  | 1680 |
| gagcgagagc gggagccccg aguaucggca gcagucagca gugccccugg acgaagagac  | 1740 |
| ccacgcaggc gaggacgugg cgguuguugc gcgcggcccg caggcgacc ugguucacgg   | 1800 |
| cgugcaggag cagaccuua uagcgacgu cauggccuuc gccgccugcc uggagccua     | 1860 |
| caccgccugc gaccuggcgc ccccgccgg caccaccgac gccgcgcacc cggguuacuc   | 1920 |
| uagagucggg gcggccggcc gcuucgagca gacauaguu uaaaccucu cccucccccc    | 1980 |
| ccccuaacgu uacuggccga agccgcuugg aaauaggccg gugugcguuu gucuauaugu  | 2040 |
| uaauuuuccac cauauugccg ucuuuuggca augugagggc ccggaaaccu ggcccugucu | 2100 |
| ucuugacgag cauuccuagg ggucuuucc cucucgcaa aggaaugcaa ggucuguuga    | 2160 |
| augucgugaa ggaagcaguu ccucuggaag cuucuuugaag acaacaacg ucuguagcga  | 2220 |
| cccuuugcag gcagcggaa cccccaccug gcgacaggug ccucugcggc caaaagccac   | 2280 |
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| uuguggaaag agucaaaugg cucuccucaa gcguauucaa caaggggcug aaggauccc   | 2400 |
| agaagguacc ccuauugaug ggaucugauc uggggccucg gugcacaugc uuuaucugug  | 2460 |
| uuuagucgag guuaaaaaaa cgucuaggcc cccgaacca cggggacgug guuuuccuuu   | 2520 |
| gaaaaacacg augauaccau gagcacaau ccuaaaccuc aaagaaaaac caaaagaaac   | 2580 |
| accaaccguc gccagaaga cguaaaguuc ccgggcggcg gccagaucgu uggcggagua   | 2640 |

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| aagaauacca  | guagcagcua  | cauggugacc | aaugacugcu  | ccaauagacag | caucacuugg  | 3180 |
| cagcucgagg  | cugcgguucu  | ccacgucccc | gggugcgucc  | cgugcgagag  | aguggggaau  | 3240 |
| acgucacggu  | guugggugcc  | agucucgcca | aacauggcug  | ugcggcagcc  | cggugcccuc  | 3300 |
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| ccgcaguacc  | acugguuugu  | gcaagaauug | aaauugcucca | ucuacccugg  | caccaucacu  | 3480 |
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|            |             |            |             |             |            |      |
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| ccccccgggu | cagugacaac  | cccccauccc | gauauagaag  | agguaggccu  | cgggcgggag | 6660 |
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| cugauuuucu | gccacucaaa  | gaaaaagugu | gacgagcucg  | cggcggcccu  | ucggggcaug | 6780 |
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| ugcgccucua | gggcggcucu  | caucgaagag | gggcagcgga  | uagccgagau  | guugaagucc | 7740 |
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